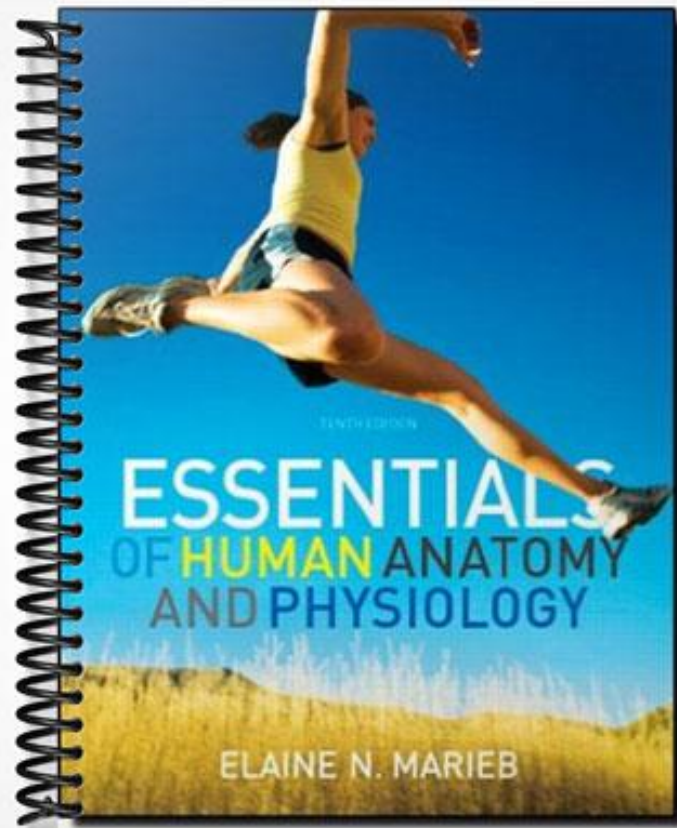


TEST BANK



Essentials of Human Anatomy and Physiology, 10e (Marieb)
Chapter 2 Basic Chemistry

2.1 Short Answer

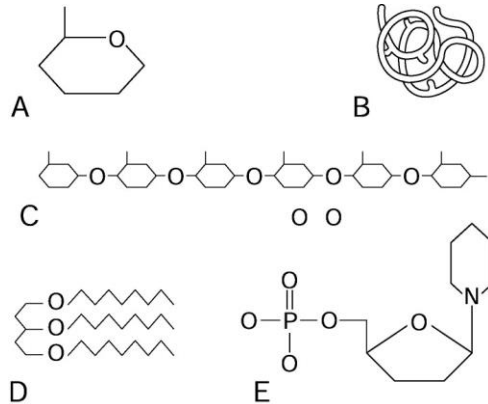


Figure 2.1

Using Figure 2.1, identify the following:

1) Which letter represents a carbohydrate polymer?

Answer: C

Diff: 3 Page Ref: 45

2) Letter D represents the structure of _____.

Answer: triglyceride

Diff: 3 Page Ref: 47

3) Letter E represents a nucleic acid building block known as a _____.

Answer: nucleotide

Diff: 3 Page Ref: 54

4) Which letter represents a globular protein in its quaternary structure?

Answer: B

Diff: 3 Page Ref: 51, 52

Fill in the blank or provide a short answer:

5) Anything that has mass and takes up space is considered to be _____.

Answer: matter

Diff: 1 Page Ref: 26

6) Nerve impulses involve the flow of an electrical current, a type of energy known as _____ energy.

Answer: electrical

Diff: 2 Page Ref: 26

7) Isotopes differ from other atoms of the same element only in the number of _____ they possess.

Answer: neutrons

Diff: 2 Page Ref: 30

8) Electrically neutral atoms have equal numbers of _____ and _____.

Answer: protons; electrons

Diff: 3 Page Ref: 29, 34

9) The sum of the protons and neutrons in an atom is called the _____.

Answer: atomic mass number

Diff: 2 Page Ref: 30

10) Compounds that contain carbon-hydrogen bonding are collectively termed _____ compounds.

Answer: organic

Diff: 2 Page Ref: 39

11) Polar molecules, like water, result when electrons are shared _____.

Answer: unequally

Diff: 2 Page Ref: 35, 37

12) The four most common elements that compose over 96% of the mass of the human body are _____, _____, _____, and _____.

Answer: oxygen; carbon; hydrogen; nitrogen

Diff: 2 Page Ref: 27

13) An acid is a molecule that releases (donates) _____. State the answer in two ways.

Answer: protons; hydrogen ions

Diff: 2 Page Ref: 41

14) All _____ have an amine (N^{H_2}) group.

Answer: amino acids

Diff: 2 Page Ref: 49

15) Glycogen and starch are examples of a specific category of carbohydrates called _____.

Answer: polysaccharides

Diff: 2 Page Ref: 44

16) A solution with a pH of 11.7 is _____ times more basic (alkaline) than a solution with a pH of 8.7.

Answer: 1000

Diff: 2 Page Ref: 42

17) Unsaturated fats contain one or more _____ bonds between carbon atoms.

Answer: double

Diff: 2 Page Ref: 48

18) Enzymes are examples of _____ proteins. State the answer in two ways.

Answer: globular; functional

Diff: 3 Page Ref: 50

19) Monosaccharides join to become a polysaccharide through a chemical reaction called _____.

Answer: dehydration synthesis

Diff: 2 Page Ref: 43

20) Nucleotides contain three components: _____, _____, and _____.

Answer: nitrogen-containing base; pentose sugar; phosphate group

Diff: 3 Page Ref: 53

2.2 Multiple Choice

1) Which of the following contains sodium:

A) H₂O

B) NaCl

C) N₂

D) CH₄

E) H₂SO₄

Answer: B

Diff: 1 Page Ref: 28

2) An atom with 11 protons, 12 neutrons, and 10 electrons is a(n):

A) molecule

B) anion

C) cation

D) isotope

E) radioisotope

Answer: C

Diff: 3 Page Ref: 34

3) The movement of ions across cell membranes is an example of:

A) radiant energy

B) chemical energy

C) electrical energy

D) mechanical energy

E) potential energy

Answer: C

Diff: 2 Page Ref: 26

4) Which of the following is classified as an inorganic compound:

- A) glucose
- B) triglyceride
- C) water
- D) protein
- E) steroid

Answer: C

Diff: 2 Page Ref: 39

5) The most abundant element in the human body is:

- A) carbon
- B) oxygen
- C) hydrogen
- D) nitrogen
- E) calcium

Answer: B

Diff: 2 Page Ref: 28

6) Which of the following leads to an increase in the rate of a chemical reaction:

- A) increased temperature
- B) large particle size
- C) lack of catalysts
- D) decreased temperature
- E) few particles

Answer: A

Diff: 3 Page Ref: 40

7) Atomic mass is equivalent to the number of _____ in an atom.

- A) protons
- B) neutrons
- C) electrons
- D) protons and electrons
- E) protons and neutrons

Answer: E

Diff: 2 Page Ref: 30

8) The major function of potassium is to:

- A) serve as a salt in bones and teeth
- B) play a role in nerve impulse transmissions and muscle contractions
- C) make functional thyroid hormones
- D) influence the pH of body fluids
- E) exist as the most abundant extracellular cation

Answer: B

Diff: 2 Page Ref: 28

9) Which of the following is the role of magnesium:

- A) it is present in bone, and is an important cofactor for enzyme activity in a number of metabolic reactions
- B) it is needed to make functional thyroid hormones
- C) it is a component of the functional hemoglobin molecule that transports oxygen within red blood cells, as well as a component of some enzymes
- D) it is the major extracellular cation in its ionic form, and is important for water balance, conduction of nerve impulses, and muscle contraction
- E) it is a major extracellular anion in its ionic form

Answer: A

Diff: 3 Page Ref: 28

10) An atom with an atomic number of 14 will have _____ electrons in its valence shell.

- A) 2
- B) 4
- C) 8
- D) 10
- E) 14

Answer: B

Diff: 3 Page Ref: 33-34

11) An atom with 6 protons, 7 neutrons, and 6 electrons shares four pairs of electrons with four other atoms. This atom is now considered to be:

- A) a cation
- B) an anion
- C) a neutral atom
- D) stable
- E) an ion

Answer: D

Diff: 3 Page Ref: 33-34

12) An atom has 6 protons, 8 neutrons, and 6 electrons. Its atomic mass is:

- A) 2
- B) 6
- C) 8
- D) 14
- E) 20

Answer: D

Diff: 2 Page Ref: 30

13) The atomic number of an atom reveals the number of:

- A) electrons in the atomic nucleus
- B) protons in the atomic nucleus
- C) protons plus neutrons
- D) protons plus electrons
- E) neutrons plus electrons

Answer: B

Diff: 1 Page Ref: 30

14) Isotopes have different numbers of _____; thus they also have different _____.

- A) protons; atomic numbers
- B) neutrons; atomic masses
- C) electrons; atomic numbers
- D) protons; atomic masses
- E) neutrons; atomic numbers

Answer: B

Diff: 2 Page Ref: 30-31

15) An atom that has lost two electrons is called a(n):

- A) isotope
- B) anion
- C) radioisotope
- D) cation
- E) proton

Answer: D

Diff: 3 Page Ref: 34

16) The subatomic particles that are responsible for the chemical behavior of atoms are the:

- A) protons
- B) neutrons
- C) electrons
- D) isotopes
- E) ions

Answer: C

Diff: 2 Page Ref: 33

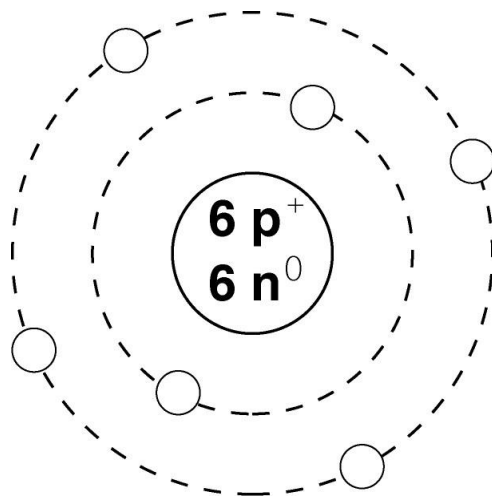


Figure 2.2

17) What is the atomic number of the atom in Figure 2.2:

- A) 2
- B) 3
- C) 4
- D) 6
- E) 12

Answer: D

Diff: 3 Page Ref: 30

18) When a pair of electrons is shared equally between two atoms, the bond formed is called a(n):

- A) ionic bond
- B) hydrogen bond
- C) carbon bond
- D) polar covalent bond
- E) nonpolar covalent bond

Answer: E

Diff: 3 Page Ref: 35

19) In the chemical reaction, $\text{HCl} + \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{NaCl}$, the chemical NaOH is considered to be:

- A) water
- B) base
- C) product
- D) acid
- E) salt

Answer: B

Diff: 2 Page Ref: 42

20) In order to break a disaccharide down into simple sugar units:

- A) water molecules must be added to each bond
- B) water molecules must be removed from each bond
- C) carbon atoms must be added to each bond
- D) carbon atoms must be removed from each bond
- E) water molecules and carbon atoms must be removed from each bond

Answer: A

Diff: 3 Page Ref: 38-39

21) The reaction sucrose + water \rightarrow glucose + fructose is an example of a(n):

- A) double replacement reaction
- B) synthesis reaction
- C) decomposition reaction
- D) neutralization reaction
- E) anabolic reaction

Answer: C

Diff: 2 Page Ref: 38-39; 44

22) Monomers are joined together to form more complex molecules through:

- A) synthesis reactions
- B) exchange reactions
- C) neutralization reactions
- D) hydrolysis reactions
- E) decomposition reactions

Answer: A

Diff: 2 Page Ref: 38-39

23) Hydrogen bonding between water molecules is responsible for:

- A) polarity
- B) denaturation of proteins
- C) enzyme structure
- D) nonpolar covalent bonding
- E) surface tension

Answer: E

Diff: 3 Page Ref: 37-38

24) Which of the following solutions is the weakest acid:

- A) a solution with a pH of 2.4
- B) a solution with a pH of 5.2
- C) a solution with a pH of 6.4
- D) a solution with a pH of 8.6
- E) a solution with a pH of 10.1

Answer: C

Diff: 3 Page Ref: 42-43

25) A solution with a pH of 7:

- A) is acidic
- B) releases more hydrogen ions than hydroxyl ions into solution
- C) releases more hydroxyl ions than hydrogen ions into solution
- D) is basic
- E) is neutral

Answer: E

Diff: 2 Page Ref: 42

26) Which of the following is an example of an inorganic molecule:

- A) a fatty acid
- B) an amino acid
- C) cholesterol
- D) hydrochloric acid
- E) RNA

Answer: D

Diff: 3 Page Ref: 42

27) Which of these vitamins is NOT fat-soluble:

- A) vitamin A
- B) vitamin C
- C) vitamin D
- D) vitamin E
- E) vitamin K

Answer: B

Diff: 1 Page Ref: 46

28) Glucose and starch are examples of:

- A) carbohydrates
- B) triglycerides
- C) phospholipids
- D) steroids
- E) proteins

Answer: A

Diff: 2 Page Ref: 44

29) Which of the following groups of chemicals includes ONLY monosaccharides:

- A) glucose, fructose, galactose
- B) glucose, fructose, maltose
- C) fructose, maltose, sucrose
- D) fructose, maltose, lactose
- E) maltose, sucrose, lactose

Answer: A

Diff: 2 Page Ref: 44

30) The organic compounds that function in building tissues and acting as enzymes are the:

- A) nucleic acids
- B) carbohydrates
- C) salts
- D) lipids
- E) proteins

Answer: E

Diff: 2 Page Ref: 49-50

31) A lipid containing three fatty acid chains and one glycerol is called:

- A) cholesterol
- B) a steroid
- C) a triglyceride
- D) a polysaccharide
- E) glycogen

Answer: C

Diff: 2 Page Ref: 45, 47

32) Why is ATP categorized as a nucleic acid:

- A) ATP has a polar region and a nonpolar region
- B) ATP contains four fused carbon rings
- C) ATP is a modified nucleotide with three phosphate groups, ribose, and adenine
- D) all nucleic acids, such as ATP, function as catalysts to increase reaction rates
- E) all nucleic acids have an amine and an acid functional group

Answer: C

Diff: 2 Page Ref: 57

33) Which of the following DNA base pairs is complementary:

- A) adenine and guanine
- B) guanine and uracil
- C) thymine and guanine
- D) cytosine and adenine
- E) adenine and thymine

Answer: E

Diff: 2 Page Ref: 56

34) Enzymes:

- A) are essential to virtually every biochemical reaction in the body
- B) help regulate growth and development
- C) are highly specialized proteins that recognize, bind with, and inactivate bacteria, toxins, and some viruses
- D) increase the rates of chemical reactions by at least a millionfold
- E) when absent or destroyed, cause all biochemical reactions to cease

Answer: D

Diff: 2 Page Ref: 51

35) Which of the following statements about enzymes is true:

- A) they are carbohydrates
- B) they are stable at high temperatures
- C) they are biological catalysts
- D) they are not reuseable
- E) they are required in large amounts in order to be effective

Answer: C

Diff: 3 Page Ref: 51

36) Saturated fats:

- A) have two fatty acid chains
- B) exist as solids at room temperature
- C) are formed from 4 interlocking carbon rings
- D) contain many double bonds
- E) exist as liquids and are derived from plants

Answer: B

Diff: 3 Page Ref: 48

37) Which of the following substances below is matched with its correct organic group:

- A) monosaccharides - nucleic acids
- B) DNA - lipids
- C) steroids - carbohydrates
- D) glycerol - proteins
- E) enzymes - proteins

Answer: E

Diff: 2 Page Ref: 51

38) Two or more polypeptides combine to form a complex structure called:

- A) primary structure
- B) beta-pleated sheet
- C) secondary structure
- D) tertiary structure
- E) quaternary structure

Answer: E

Diff: 2 Page Ref: 50, 51

39) Which of the following statements about RNA is true:

- A) RNA is single stranded
- B) RNA is composed of cytosine, guanine, adenine, and thymine
- C) RNA is found only in the nucleus of the cell
- D) RNA contains deoxyribose
- E) RNA is a double helix

Answer: A

Diff: 2 Page Ref: 56

40) The most common steroid is:

- A) phospholipid
- B) cholesterol
- C) triglyceride
- D) trans fat
- E) unsaturated fat

Answer: B

Diff: 1 Page Ref: 47, 48

41) The nucleotide chains of DNA are held together by:

- A) carbon bonds
- B) hydrogen bonds
- C) ionic bonds
- D) nonpolar covalent bonds
- E) polar covalent bonds

Answer: B

Diff: 2 Page Ref: 56

42) Which of the following statements about ATP is false:

- A) it drives the transport of certain solutes (e.g., amino acids) across cell membranes
- B) it activates contractile proteins in muscle cells so that cells can shorten and perform mechanical work
- C) it provides the energy needed to drive energy-absorbing chemical reactions
- D) it is a modified nucleotide
- E) its energy is captured in high-energy hydrogen bonds

Answer: E

Diff: 3 Page Ref: 57

43) Glycogen is the storage form of _____ in animals.

- A) protein
- B) lipids
- C) amino acids
- D) glucose
- E) DNA

Answer: D

Diff: 2 Page Ref: 45

44) _____ are simple sugars containing between 3 and 7 carbon atoms.

- A) Proteins
- B) Monosaccharides
- C) Polysaccharides
- D) Saturated fats
- E) Steroids

Answer: B

Diff: 2 Page Ref: 44

45) Shell 1 of an atom can hold a maximum of _____ electron(s).

- A) 1
- B) 2
- C) 4
- D) 8
- E) 18

Answer: B

Diff: 1 Page Ref: 33

46) Trans fats are oils that have been solidified by the addition of:

- A) oxygen atoms
- B) carbon atoms
- C) hydrogen atoms
- D) nitrogen atoms
- E) phosphorus-containing groups

Answer: C

Diff: 3 Page Ref: 48

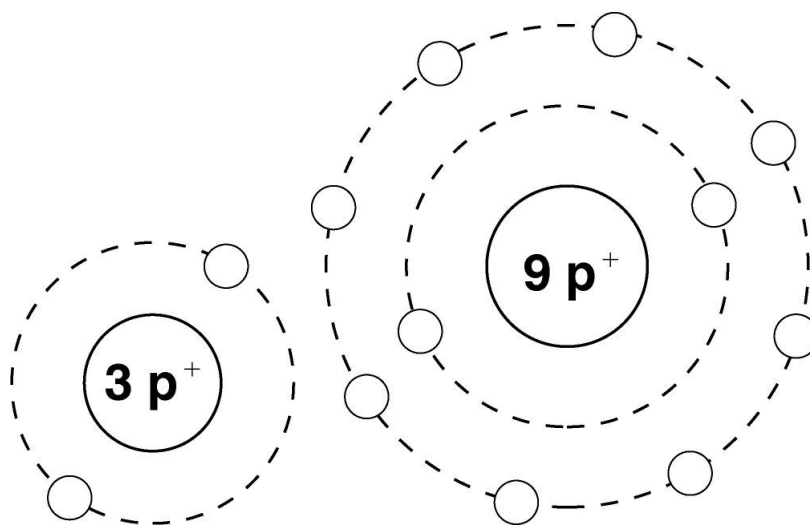


Figure 2.3

47) What type of chemical bond is pictured in Figure 2.3:

- A) nonpolar covalent bond
- B) polar covalent bond
- C) ionic bond
- D) single covalent bond
- E) double covalent bond

Answer: C

Diff: 2 Page Ref: 34

48) The sugar found in DNA is:

- A) ribose
- B) sucrose
- C) deoxyribose
- D) lactose
- E) starch

Answer: C

Diff: 1 Page Ref: 56

49) Which of these substances is an enzyme:

- A) glucose
- B) triglyceride
- C) oxidase
- D) nucleotide
- E) omega-3 fatty acid

Answer: C

Diff: 3 Page Ref: 53

50) Nucleotides are composed of:

- A) three fatty acid chains and one glycerol
- B) peptide bonds
- C) a phosphate group, a five-carbon sugar, and a nitrogen-containing base
- D) four fused carbon rings
- E) amino acids with an amine group and an acid group

Answer: C

Diff: 2 Page Ref: 53

2.3 True/False

1) Inactive or stored energy is called kinetic energy.

Answer: FALSE

Diff: 1 Page Ref: 26

2) The number of protons in an atom equals the atomic number for that element.

Answer: TRUE

Diff: 1 Page Ref: 30

3) Negatively charged atoms are called cations.

Answer: FALSE

Diff: 3 Page Ref: 34

4) Atoms are the smallest particles of a compound that still retain the properties of that compound.

Answer: FALSE

Diff: 2 Page Ref: 32

5) The four most common elements in the human body, in order of descending quantity, are hydrogen, carbon, oxygen, and nitrogen.

Answer: FALSE

Diff: 1 Page Ref: 28

6) Every atom in a molecule has a full valence shell.

Answer: TRUE

Diff: 2 Page Ref: 35

7) Water is the single most abundant inorganic compound in the human body.

Answer: TRUE

Diff: 1 Page Ref: 40

8) The lower the pH, the greater the number of hydrogen ions.

Answer: TRUE

Diff: 3 Page Ref: 42, 43

9) Acids are defined as proton donors since they release hydrogen ions.

Answer: TRUE

Diff: 2 Page Ref: 41

10) Carbon is found in all inorganic compounds.

Answer: FALSE

Diff: 1 Page Ref: 39

11) When a solution produces equal numbers of hydrogen and hydroxyl ions, it is said to be neutral.

Answer: TRUE

Diff: 1 Page Ref: 42

12) On the pH scale, zero is considered to be neutral because hydrogen ions and hydroxyl ions are equal.

Answer: FALSE

Diff: 2 Page Ref: 42

13) Glucose and fructose are classified as disaccharides.

Answer: FALSE

Diff: 1 Page Ref: 44

14) Phospholipids are composed of three fatty acid chains attached to one glycerol head.

Answer: FALSE

Diff: 2 Page Ref: 48

15) Disruption of the hydrogen bonds of functional proteins leads to their denaturation.

Answer: TRUE

Diff: 2 Page Ref: 50

2.4 Matching

Match the following:

- A) Oxygen
- B) Water
- C) Acid
- D) Salt
- E) Base
- F) Neutral

1) Substance that is a proton donor
Diff: 2 Page Ref: 41

2) Most abundant inorganic compound in the body
Diff: 2 Page Ref: 40

3) Substance that releases hydrogen ions
Diff: 2 Page Ref: 42

4) Substance that releases equal amounts of hydrogen and hydroxyl ions
Diff: 2 Page Ref: 42

5) Ionic compound containing cations other than hydrogens and anions other than hydroxyls
Diff: 2 Page Ref: 41

Answers: 1) C 2) B 3) C 4) F 5) D

Match the following:

- A) protons and neutrons
- B) proton(s)
- C) electron(s)
- D) electron(s) and neutron(s)
- E) neutron(s)
- F) protons and electrons
- G) proton(s) and neutron(s)

6) The particle(s) contributing to the atomic mass

Diff: 1 Page Ref: 30

7) The particle(s) contributing to the atomic number

Diff: 1 Page Ref: 30

8) The particle(s) shared during covalent bond formation

Diff: 1 Page Ref: 34-35

9) The particle(s) that differ between isotopes

Diff: 1 Page Ref: 30

10) The particle(s) located within the nucleus

Diff: 1 Page Ref: 27, 29

11) The particle(s) lost during cation formation

Diff: 2 Page Ref: 34

12) The number of protons is equal to the number of these subatomic particles

Diff: 2 Page Ref: 30

Answers: 6) A 7) B 8) C 9) E 10) G 11) C 12) C

Match the following:

- A) carbohydrates
- B) amino acids
- C) triglycerides
- D) saturated fat
- E) steroids
- F) nucleic acids
- G) enzymes
- H) proteins
- I) lipids

13) Building block is the monosaccharide

Diff: 1 Page Ref: 44

14) DNA, RNA, and ATP are types of these organic compounds

Diff: 1 Page Ref: 53, 57

15) Triglycerides, steroids, and fat-soluble vitamins are types of these organic compounds

Diff: 1 Page Ref: 45, 46

16) Antibodies, some hormones, and enzymes are types of these organic compounds

Diff: 1 Page Ref: 52

17) Type of lipid composed of four interlocking rings

Diff: 1 Page Ref: 48

18) Nucleotides form the building blocks of these organic compounds

Diff: 1 Page Ref: 53

19) The hydrolysis of proteins produces these building blocks

Diff: 3 Page Ref: 43, 49

20) Most of this organic compound group are water insoluble

Diff: 1 Page Ref: 45

Answers: 13) A 14) F 15) I 16) H 17) E 18) F 19) B 20) I

2.5 Essay

1) Describe the role of the electron in chemical bond formation.

Answer: When the valence shell of an atom contains fewer than 8 electrons, an atom will tend to gain, lose, or share electrons with other atoms to reach a stable state. As a result, chemical bonds such as covalent bonds or ionic bonds are formed.

Diff: 2 Page Ref: 33

2) Differentiate between the method of determination of the atomic number and the atomic mass.

Answer: The atomic number is determined by the number of protons in that atom. The atomic mass is the sum of the protons and neutrons in the atom's nucleus.

Diff: 2 Page Ref: 30

3) How are ions different from neutral atoms? Explain.

Answer: Ions are atoms that have lost or gained electrons through ionic bonding. Neutral atoms have equal numbers of positive and negative charges. In other words, neutral atoms have the same numbers of protons and electrons.

Diff: 3 Page Ref: 34

4) Explain how saturated fats are different from unsaturated fats.

Answer: Saturated fats:

1. tend to be animal fats
2. have all single bonds between carbon atoms
3. may be solid

Unsaturated fats:

1. tend to be plant oils
2. have some double or triple bonds between carbon atoms
3. may be liquid

Diff: 2 Page Ref: 46, 48

5) Distinguish between a dehydration synthesis and a hydrolysis reaction.

Answer: In a dehydration synthesis reaction, a more complex molecule is formed from two simpler ones, and a water molecule is lost as each bond forms. An example of dehydration synthesis is seen when a disaccharide is formed from two monosaccharides. Hydrolysis is the breakdown of a more complex molecule into its building blocks. A water molecule is added to each bond, the bond is broken, and simpler molecules are formed. In the process, water is split into a hydrogen ion and a hydroxyl ion. An example of hydrolysis is seen when a disaccharide is broken down into two monosaccharides.

Diff: 3 Page Ref: 38, 43

6) Explain why ATP is classified as a nucleic acid.

Answer: ATP is a modified nucleotide. Nucleotides are the building blocks of nucleic acids. ATP consists of a base (adenine), a sugar (ribose), and three phosphate groups.

Diff: 2 Page Ref: 57

7) Explain why hydrolysis (decomposition) reactions require the addition of water.

Answer: Water molecules are added to the bonds of large organic molecules. When water is added to each bond, the bond is broken, and the molecule is broken down.

Diff: 3 Page Ref: 43

8) Explain why a denatured protein no longer functions.

Answer: Denaturation results when the three-dimensional shape of a protein is destroyed. The function of a protein depends on its structure. The presence of an active site on the surface of a protein that interacts with other molecules must be intact for the enzyme to work properly.

Diff: 3 Page Ref: 50

9) Discuss the organization of the pH scale, including the location of acids, bases, and neutral substances.

Answer: The pH scale is based on the number of hydrogen ions in solution. The pH scale is constructed from zero to 14. Each sequential change of one pH unit represents a ten-fold change in hydrogen ion concentration. Solutions with a pH lower than seven are considered acidic while solutions with a pH greater than seven are considered basic (alkaline). At a pH of seven, the solution is neutral since hydrogen ion concentration equals hydroxyl ion concentration.

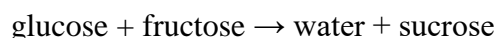
Diff: 2 Page Ref: 43

10) Describe the four structural levels of proteins.

Answer: 1. The primary structure of a protein resembles a string of beads in which the amino acids form the basis for the protein molecule.
2. A protein in its secondary structure may exist in a coiled alpha-helix or an accordian-like beta-pleated sheet.
3. Most proteins reach the more complex tertiary level of structure. The tertiary structure is achieved when the alpha-helical or beta-pleated region of the polypeptide chain folds in on itself to form a globular (ball-like) molecule.
4. The quaternary structure results when two polypeptide chains combine to form a complex protein.

Diff: 2 Page Ref: 50, 51

11) Name this type of reaction and briefly explain what is happening in this reaction:



Answer: Glucose and fructose are two monosaccharides. Sucrose is a disaccharide. Glucose and fructose are combining to form sucrose. This is an example of a dehydration synthesis reaction. A water molecule is lost from the two simple sugars as the bond forms to create the double sugar.

Diff: 3 Page Ref: 43, 44

12) Which molecule stores more energy: glucose or glycogen? Explain

Answer: Glucose is a monosaccharide while glycogen is a polysaccharide. Glycogen is constructed of glucose molecules linked together by dehydration synthesis. Therefore, the glycogen molecule stores more energy since it has many glucose molecules bonded together.

Diff: 3 Page Ref: 44, 45

13) Describe the difference between a polar and a nonpolar covalent bond. Give and explain an example of each type of bond.

Answer: 1. In polar covalent bonds, electrons are not shared equally. For instance, water is an example of a polar covalent bond. The electron pairs shared in water spend more time with the oxygen atom causing that end of the molecule to become slightly negative and the hydrogen end to become slightly positive.
2. In nonpolar covalent bonds, electrons are shared equally. For example, the electron pairs in carbon dioxide orbit the entire molecule.

Diff: 3 Page Ref: 35, 37